**//Day 3 of learning Operating System**

**Program**: A Program is an executable file which contains a certain set of instructions written

to complete the specific job or operation on your computer.

• It’s a compiled code. Ready to be executed.

• Stored in Disk

**Process**: Program under execution. Resides in Computer’s primary memory (RAM).

**Thread**:

• Single sequence stream within a process.

• An independent path of execution in a process.

• Light-weight process.

• Used to achieve parallelism by dividing a process’s tasks which are independent path

of execution.

• E.g., Multiple tabs in a browser, text editor (When you are typing in an editor, spellchecking,

formatting of text and saving the text are done concurrently by multiple

threads.)

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| **Multi-Tasking** | **Multi-Threading** |
| The execution of more than one task  simultaneously is called as multitasking. | A process is divided into several different  sub-tasks called as threads, which has its  own path of execution. This concept is  called as multithreading. |
| Concept of more than 1 processes being  context switched. | Concept of more than 1 thread. Threads are  context switched. |
| No. of CPU 1. | No. of CPU >= 1. (Better to have more than  1) |
| Isolation and memory protection exists. OS must allocates separates memory and resources to each program that CPU is executing. | No isolation and memory protection, resources are shared among threads of that  process.  OS allocates memory to a process; multiple  threads of that process share the same  memory and resources allocated to the  process. |

Thread Scheduling: Threads are scheduled for execution based on their priority. Even though threads are executing within the runtime, all threads are assigned processor time slices by the operating system.

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| Thread Context switching | Process context switching |
| OS saves current state of thread & switches to another thread of same process. | OS saves current state of process & switches to another process by restoring its state. |
| Doesn’t includes switching of memory address space. (But Program counter, registers & stack are included.) | Includes switching of memory address space. |
| Fast switching. | Slow switching. |
| CPU’s cache state is preserved. | CPU’s cache state is flushed. |